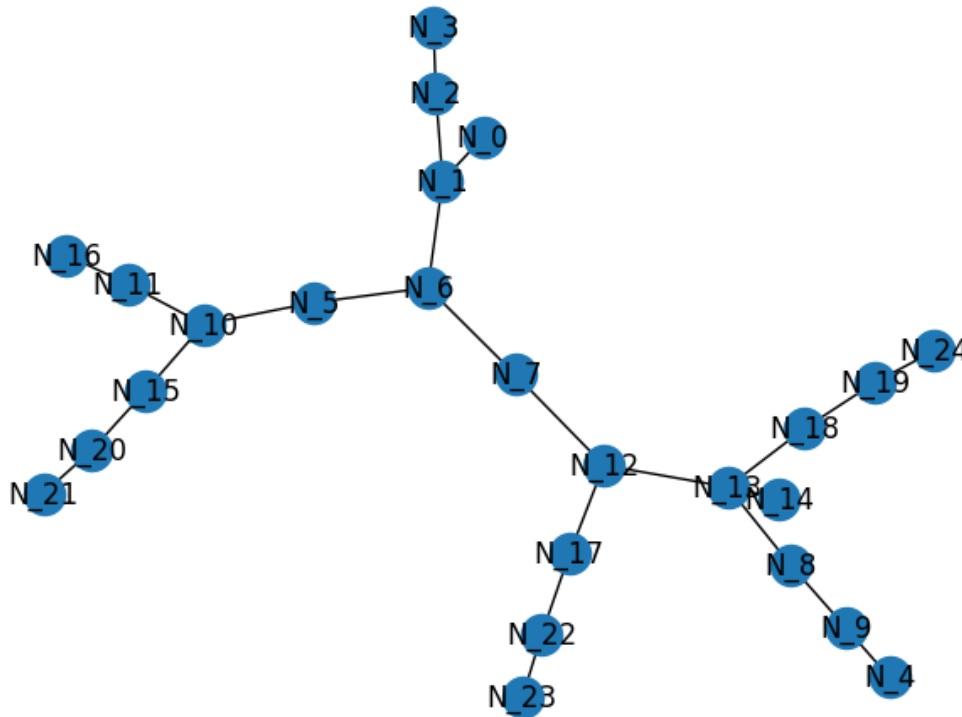


COMP 3270 – Introduction to Algorithms
Programming Assignment 2 – Graph Traversal Algorithms
Due: 11/12/2023

1. Overview

Imagine you are given a dataset that represents a social network, where individuals are nodes in the graph, and their connections or friendships are represented as edges in an edge list. Your task is to analyze this social network to extract valuable insights. The dataset is in the form of an edge list. A visualization of the graph is shown below to help you.



Input:

An edge list file where each line represents a friendship connection between two individuals, e.g., "N_0, N_1."

Output:

A report with a table such as the one below that documents the length of the shortest path between two individuals (or vertices) in this graph and the time taken to find the path between the two nodes. You must explore all pairs indicated in the table and complete the table below for each of the following algorithms. You should not include an entry if there are no paths between the two nodes. Use the graph above to identify if the nodes have paths connecting them.

Node 1	Node 2	BFS		DFS	
		Distance	Time (ms)	Distance	Time (ms)
N_0	N_1				
N_0	N_2				
N_0	N_3				
N_0	N_4				
N_0	N_5				
N_0	N_6				
N_0	N_7				
N_0	N_8				
N_0	N_9				
N_0	N_10				
N_0	N_11				
N_0	N_12				
N_0	N_13				
N_0	N_14				
N_0	N_15				
N_0	N_16				
N_0	N_17				
N_0	N_18				
N_0	N_19				
N_0	N_20				
N_0	N_21				
N_0	N_22				
N_0	N_23				
N_0	N_24				

You must explore the following algorithms. Breadth First Search (BFS) and Depth-First Search (DFS). For each of the node pairs in the table, you must run BFS/DFS with the start node as Node 1 and terminate the algorithm

when Node 2 is reached. For example, to find the distance between N_0 and N_1 , the start node is N_0 . The algorithm terminates when N_1 is visited or “explored” by the algorithm. The distance is the total number of nodes visited by the algorithm before reaching the target vertex.

Your report should also have a brief description of the data structure that you will use to represent the graph and a short justification.

The goal of this assignment is to analyze how long it takes for BFS and DFS to reach nodes at different depths. Based on your experiments above, briefly answer the following questions with an example:

1. Suppose you want to find a path between nodes at a shallow depth to your start node. Would you use BFS or DFS?
2. Suppose that the end node is at a very large depth from the start node. Would you use BFS or DFS?